HIGH TECHNOLOGY INDUSTRY IN HAMILTON-WENTWORTH

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

REGIONAL MUNICIPALITY OF
HAMILTON-WENTWORTH
PLANNING AND DEVELOPMENT
DEPARTMENT

007498

HIGH TECHNOLOGY INDUSTRY IN HAMILTON-WENTWORTH

SUMMARY

This report assesses the feasibility and practicality of high technology development in Hamilton-Wentworth. The key findings of the analysis are listed below.

- High technology industry can benefit a regional economy by increasing employment and assessment, and by diversifying economic activity. High-tech firms project a positive image and are generally considered to be clean industry.

- Although high technology is growing faster than most other sectors of the economy, its contribution to increased employment will be modest for the foreseeable future, because the high-tech sector is small and its productivity is growing rapidly.

- Emphasis on labour force, presence of a high-tech concentration, proximity to a university, quality of life and community image distinguish the most important locational criteria for high technology firms from those of traditional industry.

- Hamilton-Wentworth has good potential for developing high technology industry from within the Region, principally as a spin off from McMaster University. However, the potential for attracting established high-tech firms from outside the Region is limited because of the small number of such firms, intense competition from other municipalities, and Hamilton's heavy industrial image.

- Setting aside large blocks of land exclusively for high tech firms in any of the Industrial-Business Parks could have the effect of freezing the land for many years.

- High-tech uses can best be accommodated on "prestige" industrial land in the Ancaster, Allarco and Clappison's Corners Industrial-Business Parks.

BACKGROUND:

This report examines the feasibility of establishing a high technology industrial business park in Hamilton-Wentworth. The analysis was conducted by the Planning and Development Department in consultation with the Economic Development Department.

At the June 11th meeting of the Economic Development Committee Dr. John Bienenstock, Vice President of A-B Biological Supplies Incorporated, presented a proposal to designate a portion of the Ancaster Industrial-Business Park for a "High Technology Center". The committee referred the matter to staff to research and prepare a report analyzing the need for this type of development, and to determine if high technology development is feasible in this area. The Director of Economic Development requested that the Planning and Development Department prepare a report examining the feasibility of developing a high technology park in Hamilton-Wentworth and, if feasible, defining an appropriate location.

INTRODUCTION

The report contains eight major sections covering the following topics:

- the strategic choices available to Hamilton-Wentworth in dealing with high technology;
- the benefits of high technology industry;
- the disadvantages of a focus on high technology;
- the locational requirements of high technology industry;
- the potential for attracting high technology industry to Hamilton-Wentworth;
- the potential for developing high technology industry within Hamilton-Wentworth.
- the most appropriate location for high technology development
- conclusions.

A selection of the numerous reports and studies consulted in the preparation of this analysis can be found in Appendix 'A'.

A common understanding of the term "high technology" is needed as a first step in addressing the issues related to high technology development. High technology involves the application of advances in science and technology to change existing economic structures or processes or to create new products and services. One key characteristic of high technology products is their rapid rate of change. They are constantly being reinvented or improved. As a result, high technology firms rely more heavily on research and development and employ a larger proportion of scientists, engineers and technicians than traditional manufacturing industries. Examples of high technology products are: computers; telecommunications; laser systems; radar and sonar equipment; robotics; computer aided design and manufacturing; biotechnology; aerospace; and ocean technology.

High technology products are derived from developments at the leading edge of science and engineering research and have transforming capabilities based on technology. Their transforming properties can result in three types of economic changes. Firstly, high technology products can change the production process for many businesses by making production more efficient, or by increasing either the quantity or quality of the outputs. Examples include robots painting cars on the assembly line, computers and word processors in offices, and broadcasting via satellite. Secondly, high technology products can change the nature of other products for which they are inputs (e.g., quartz watches, electronic cameras). Thirdly, high technology products can create new components of final demand (e.g., video cassette recorders, personal computers).

High technology firms can be divided into four categories according to the function performed by a particular establishment:

(1) High technology research and development facilities.
(2) High technology manufacturing.
(3) High technology service organizations; and,
(4) Head or regional offices of high technology firms.

A firm may be involved in one or more of these categories of high technology industry. Different functions may be integrated in one location or may be separated (e.g., research and development facilities may be separate from production plants).

Those firms involved in the development and production of high technology products are of principal interest in this study, since they provide the nucleus of any new technology park and tend to attract other high technology research, manufacturing and service establishments. High technology service industries have less tendency to attract research and development or manufacturing establishments or to create agglomerations. The development and production of high technology products also aids in technological diffusion throughout the regional economy.

Although it is beyond the mandate of this report, **the process of technological diffusion will almost certainly prove to be the most important way in which high technology affects the regional economy** in the foreseeable future. Technological diffusion occurs when traditional industries apply high technology in their production processes. It is often stated in the literature that the most important contribution of high-tech will be the revitalization of existing industries through high technology applications.

STRATEGIC CHOICES

Several possible strategies for high technology are available to the Region:

(1) Allocate a specific section of an industrial-business park for high technology industry and attempt to attract high technology firms to the Region through a vigorous marketing program.

(2) Concentrate marketing efforts and assistance primarily on high technology firms generated from within the Region and ensure that an adequate supply of very high level prestige industrial land in suitable locations is available to high technology firms.

(3) Select a specific sector of high technology industry in which the Region has or could easily develop a competitive advantage, focus both external and internal marketing efforts on this sector, and set aside an area for it in an industrial-business park.

(4) Make no special provisions for high technology firms in the industrial-business parks and provide marketing support only in response to inquiries.

(5) Attempt to find ways to increase the rate of diffusion of high technology to existing industry.

The rest of this report will analyse the appropriateness of these strategies, with the exception of (5), which is compatible with any of the other strategies and will be dealt with at a later date.

BENEFITS OF HIGH TECHNOLOGY INDUSTRY

Based on the well publicized success of high technology centers in the Silicon Valley in California, the Research Triangle in North Carolina, and along route 128 in Boston, many communities are trying to attract high technology firms to create industrial growth. High technology development can benefit communities in several ways:

(1) **High technology firms can increase the rate of growth of regional economies, employment, and assessment.** An article entitled "Planners, Technology and Economic Growth" in the Summer 1984 Journal of the American Planning Association argues that high technology industries are better job generators than other manufacturing industries. It refers to a 1983 study by Anne Markusen, which found that high-tech firms had an annual employment growth rate of 8 percent between 1972 and 1977, compared to a growth rate of 3 percent for manufacturing industries.

In Ontario during the 1970's, employment in high-tech manufacturing increased by 2.3 percent (2.4 percent for Canada), compared with 1.3 percent average annual growth for total manufacturing employment, according to a 1984 Ontario budget paper on technological innovation and diffusion. The budget paper also states that between 1979 and 1981 there was an 11.7 percent increase in employment in high-tech industries in Ontario.

Attracting high technology firms to a region also creates indirect employment for construction and maintenance workers, retail and wholesale establishments, and suppliers through increased demand for goods and services. The establishment of high technology plants will also increase the assessment base and produce additional tax revenues.

(2) **High technology firms can diversify the regional economic base.** The March 23, 1983 edition of Business Week suggests that high technology industries are perceived to be less vulnerable to both cyclical and structural changes in the economy. A study of high technology industries in the San Francisco Bay area by the Association of Bay Area Governments (ABAG) found that "[g]enerally, high technology firms can balance a local economy by expanding or diversifying the industrial base, cushioning a community against economic downturns in other local basic industry".

(3) **High technology firms are attractive corporate citizens, providing economic development with minimal adverse environmental impacts.** Communities seeking industrial growth generally evaluate high technology activity in a very positive light. It is seen as a clean, no problem industry, according to the ABAG study. High technology industries tend to locate on high level prestige land, construct aesthetically pleasing buildings, and further the cultural development of the community through their professional and scientific employees. The tendency of high technology firms to locate in close proximity to one another means that attracting a high-tech firm increases the likelihood of attracting others. High technology firms create development that can improve the area's image and increase the probability of further economic development within the region.

DISADVANTAGES OF A FOCUS ON HIGH TECHNOLOGY INDUSTRY

Although the successful establishment of a high technology center would result in substantial economic benefit, making high technology the major focus in a regional industrial strategy could have significant disadvantages:

(1) **The increase in total employment that can be generated by high technology firms is overrated.** Robert B. Reich, professor of political

economics at Harvard University and author of The Next American Frontier, states, "It's foolish to hope that high technology is going to be the salvation of all the people who are out on the street".

While employment in high technology industries is growing rapidly, the employment base is small. The small base limits the number of jobs created in the high-tech sector. A 1984 Ontario budget paper states that, "[t]he relatively small size of the high-tech sector means that the majority of new jobs in the Ontario economy will be in other industries."

The limited ability of high technology industries to create jobs is confirmed by three recent studies. Henry M. Lavin and Russel Rumberger of Stanford University found that the total number of new jobs generated by high technology firms from 1978 to 1990 will be vastly outnumbered by employment growth in other areas. Long term forecasts of industry employment growth by the United States Bureau of Labour Statistics (BLS) predict that high technology will grow more rapidly than general manufacturing during the 1980's, but that the absolute number of new high-tech jobs will be small compared to the number created in non-manufacturing industries.

A study by Data Resources Inc. published in the March 28, 1983 edition of Business Week attributes the modest number of jobs created by high technology firms to the relatively small size of the sector and the rapid rate of productivity growth within the sector. Data Resources found that high-tech industries in the United States employed 3 million workers in 1979, or about 3 percent of the nation's non-agricultural labour. This total is expected to rise to 4 percent by 1993. Output per high-tech worker is projected to increase by 46 percent between 1983 and 1993. During the same period the anticipated productivity increases in the manufacturing and service sectors are 24 percent and 23 percent respectively. Consequently, the dollar output in high-tech industries is projected to grow 87 percent during the decade (from 7 percent of the gross national product to 10 percent, or 206 billion dollars), but the number of workers needed will increase by only 29 percent. As these industries automate production the growth of high-tech employment will not be as rapid. For example, in 1980 they employed 3.6 machine operators for every engineer. Data Resources predicts that by 1993 the ratio will decrease 11 percent to 3.3 to 1.

(2) **Only a few of the many communities seeking high technology development will be successful.** The rate of failure is high. An article entitled "America Rushes to High Technology for Growth" in Business Week, estimates that nearly all of the 4500 economic development agencies in the United States are attempting to attract high technology industries. A similar situation probably prevails in Canada. In the March 1984 edition of Urban Land, a number of trends in the high-tech field in the 1980's are identified. One trend is the failure of most high-tech development efforts. The authors suggest that one or two major areas will develop to the level of Route 128 and Silicon Valley but,

URBAN DOCUMENTATION CENTRE
RESEARCH UNIT FOR URBAN STUDIES
McMASTER UNIVERSITY
HAMILTON, ONTARIO

"[many investment dollars may be lost by those who get caught up in Chamber of Commerce enthusiasm and unrealistic expectations". Another trend suggested is that interest in high-tech real estate development will create an oversupply of improved land and buildings. The resulting stiff competition will increase the risk of failure. A study titled Development of High Technology Industries in New York State Special Report III determined that the failure rate of pure science parks (i.e., those with no industry or services of any kind) is over 80 percent.

(3) **The creation of a new high technology park or the allocation of part of an existing park exclusively for high technology uses would effectively freeze development of much of the designated area for many years.** For example, in the Summer 1984 edition of the Journal of the American Planning Association, Michael Piltz and Marc Weiss conclude that "[research parks are risky, long term investments in that many remain substantially underused for a number of years". The high technology centers in Boston, California and North Carolina all had long gestation periods. Even the most promising parks did not receive immediate rewards. The New York State Study cited above states that, "[i]t often takes as much as 8-10 years for a park to germinate from the initial seed stages to a successful venture. A need to show immediate or short term returns often causes disaster."

(4) **High technology manufacturing firms frequently prefer low wage areas.** The literature consistently shows an increasing trend toward locating assembly plants in low wage areas. In 1981 a study of high technology growth in the San Francisco Bay area was conducted by the Association of Bay Area Governments (ABAG). One finding of the study is that, "...lower wages outside the United States can lead companies to shift operations overseas. Low skilled assembly line jobs are particularly vulnerable to this type of move." Firms exporting high technology jobs include Atari, Apple Computer, Intel, National Semi Conductor, Mattel, and Hewlett Packard. In the April 13, 1983 edition of Iron Age, Leslie Goldwater writes, "[a]s the manufacturing of many high-tech products is streamlined and fewer skills are required to make them, producers naturally will export the jobs to countries with lower labour costs."

LOCATIONAL REQUIREMENTS FOR HIGH TECHNOLOGY FIRMS

Current literature suggests that high technology firms consider the factors listed below when selecting feasible new sites. This list is a general statement of the requirements of established high technology firms looking for a new plant site. Since high technology refers to many types of industries, the ranking or importance of the various factors will not be the same for all firms or all sizes of firm. It is not necessarily applicable to new firms starting up in a given area or to

assembly firms where no research, development or design work occurs. The key factors are:

- Ability to attract and retain highly-skilled labour (technical, skilled and professional).
- Proximity to a recognized technical university.
- A community image compatible with high technology.
- The presence of a high technology agglomeration.
- Quality of life considerations, including proximity to schools of high quality and recreational and cultural opportunities.
- Labour costs.
- Good transportation for people, including an international airport.
- Ample area for expansion.
- Community attitudes toward business.
- Cost of property and construction.
- Local tax rates.
- Good transportation for materials and products.
- Proximity to customers.

The ability to attract and retain an adequate **labour force** is the most important consideration in new site selection. Access to an adequate labour force is difficult to assess since manpower needs are very company specific. In general, firms that concentrate on research and development or design work need specialized, highly trained personnel with advanced degrees as well as technical staff. High-tech manufacturing plants need a large number of technician level employees. Assembly facilities need semi-skilled and unskilled employees.

To develop and maintain an adequate highly skilled work force, the **quality of life** must be high enough that the area is perceived as a desirable place to work and live. Major quality of life considerations include: pleasant neighbourhood environments with ample affordable and appropriate housing, convenient transportation networks, entertainment and cultural amenities such as museums, art galleries, live theatre, and year round sports and recreational facilities. The importance of quality of life factors and image considerations causes the locational decisions

of high technological firms to be more qualitative in nature than those in traditional industries.

A **positive perception** of the community by corporate executives is essential for the area to receive consideration as a new site location. Once a small list of potential sites is developed, corporate executives usually visit various sites to get a subjective feel for the environment and area attractions. Conveying a positive community attitude toward the establishment of more high technology firms is very important because location selection is largely based on the personal judgments of top executives on the suitability of the site.

Universities are important amenities that contribute to the intellectual and cultural climate. More importantly, universities provide the advances in basic science that enable high technology entrepreneurs to develop marketable products. High technology industries consistently locate in close proximity to high quality universities with strong programs in fields related to high technology. Universities are important as a continuing source of new employees and they also provide opportunities for staff engineers and scientists to attend seminars, participate in research, or teach.

The emphasis on the labour force, proximity to a university, presence of a high-tech agglomeration, image of the community and quality of life distinguish high technology locational criteria from the locational factors for traditional industries.

THE POTENTIAL FOR ATTRACTING HIGH TECHNOLOGY INDUSTRY TO HAMILTON-WENTWORTH

To assist in the analysis of the feasibility of attracting high technology firms to Hamilton-Wentworth, a review of literature describing the characteristics of successful high technology centers was undertaken. Two studies, one by David Birch published in 1979, and another by Robert Premus of the United States Congress Joint Economic Committee published in 1982, are frequently cited. The findings of these studies are very similar. They suggest that:

1. The well known high technology centers in Boston, California and North Carolina gained prominence only after a long and laborious gestation period.

2. A major source of support for the scientific and technological infrastructure of these regions is the Federal government's procurement of research and development, products and services.

3. Their scientific and technological infrastructure creates an incubator environment to spin off new companies and encourages the expansion of existing companies.

While these studies provide insight into the development of high technology centers, following historical growth patterns does not assure successful future developments.

Hamilton-Wentworth appears to meet most of the locational criteria for high technology firms specified in the previous section. However, it is unlikely that the Region will attract a significant number of high technology firms. Four key factors militate against attracting high technology firms to Hamilton-Wentworth:

1. **Relatively few high technology firms are seeking new locations.** Although high technology industry is rapidly growing, it is still only a small share of total economic activity.

   Two trends reduce the likelihood that Hamilton-Wentworth would be able to attract a significant number of high technology firms. Between 1981 and 1986, Canada's percentage distribution of American owned high technology plants and permanent offices is not expected to increase from its 1981 level of 3.5 percent, according to a survey by the Joint Economic Committee of the U.S. Congress. The authors conclude that there is an apparent lack of interest in Canada for expansion. More new plant construction is expected to take place in low wage countries, at the expense of Canada and parts of the United States.

   Furthermore, entrepreneurs establishing new high technology enterprises usually locate in an area with which they are familiar. For example, a Science Council of Canada and Statistics Canada study of the Ottawa high technology center discovered that 41 of 45 surveyed firms were founded by individuals already associated with the Region of Ottawa-Carleton.

2. **Hamilton-Wentworth lacks a high technology agglomeration.** High tech firms consistently display a preference for areas with an existing agglomeration of high technology industries. Agglomerations permit economies of scale, provide a skilled labour pool and allow professionals a variety of employment opportunities and social interaction among peers. Hamilton-Wentworth does not have a high tech agglomeration but must compete with areas that do.

3. **Hamilton-Wentworth's heavy industrial image is not attractive to high technology industry.** Hamilton has a reputation as the "Steel Capital of Canada" and a heavy industrial center. Unfortunately, people associate this with smokestacks and pollution; this image is reinforced by the view of Hamilton from

the Q.E.W. Many high technology firms would not consider Hamilton-Wentworth as a location since they are very image conscious and do not wish to be associated with heavy industrial uses. It is possible that the image problem could be reduced by means of a marketing campaign designed to differentiate a suburban industrial-business park (e.g., in Ancaster) from the Bay Front industrial area in Hamilton. Such an approach would be expensive, time-consuming and uncertain in its effectiveness.

4. **Hamilton-Wentworth has no apparent comparative advantage in attracting high technology.** Many communities view high technology industry as desirable. The competition for the relatively small high-tech pie is fierce. While the Region appears able to satisfy the requirements of high technology firms, it cannot offer a compelling reason for these firms to favour it over major competitors such as Toronto, Ottawa and Montreal.

   Similarly, a concentrated effort to attract one particular sector of high technology is unlikely to be effective. Kitchener-Waterloo has a significant competitive advantage for computer related high technology industries because of the University of Waterloo's well-known computer orientation and existing computer-related industry. Cambridge has the Ontario CAD/CAM Center. These neighbouring municipalities will provide significant competition for further development in these high technology fields. Hamilton-Wentworth may be able to attract biotechnology, special materials, or nuclear-related high technology industry because of the expertise in these fields as McMaster University. Unfortunately, the number and scale of potential firms in these fields is likely to be very limited and does not justify the allocation of large blocks of land exclusively for these uses.

The difficulty of attracting high technology firms to Hamilton-Wentworth is confirmed by two recent studies. Kenneth Bowlby of the University of Western Ontario found that Hamilton placed 16th of 21 cities and regions in Canada as a location for plant expansion or relocation. His survey asked companies to select their three most preferred locations from a list that included Hamilton. No companies selected Hamilton as their first choice. Companies interested in Hamilton were primary manufacturers. Hamilton received a very low average score that indicates that even when considered, the area is seldom strongly preferred. Consequently, Bowlby concludes that Hamilton would have a difficult time competing with other areas under consideration as a potential site. Cities that were rated highly by high technology manufacturing firms were Toronto, Ottawa, and Montreal.

In 1981 Guy Steed of the Science Council of Canada and Don DeGenova of Statistics Canada conducted a study of high technology companies in Ottawa. Executives were asked to rate the ability of 11 Canadian cities

to satisfy their firms locational requirements. A five point scale was used with 1 being Very Satisfactory, 3 Acceptable and 5 Very Unsatisfactory. Only 8.1% of the companies surveyed felt Hamilton could very satisfactorily meet their firm's locational requirements. Hamilton ranked behind Ottawa, Toronto, Montreal, Vancouver and Kitchener-Waterloo. The highest ranked cities, Ottawa and Toronto, were perceived as being very satisfactory locations by 63.6 percent and 37.5 percent of the companies respectively. Hamilton was rated as an acceptable location (1,2, or 3 on the 5 point scale) by 18 of the 37 high-tech companies surveyed in Ottawa, which placed Hamilton 7th out of 11 cities. Only London, Edmonton, Winnipeg and Halifax received a lower proportion of acceptable ratings.

Given the localized nature of high tech development in Canada and the preference of assembly firms to locate plants in foreign low wage areas it will be difficult for any region in Canada to attract a large number of existing high technology industries. Hamilton-Wentworth's heavy industrial image and its apparent lack of competitive advantage over major Canadian high-tech centers will make it even more difficult for the Region to attract a significant number of new high technology firms.

DEVELOPING HIGH TECHNOLOGY INDUSTRIES WITHIN THE REGION

Since Hamilton-Wentworth has many attributes that could appeal to high tech firms, the potential for developing a high technology area within the Region should be examined.

The Region already has approximately 40 companies or divisions of companies that can be considered high technology. This total is an approximation since it is difficult to identify all high technology service industries. Fifteen of the 40 firms are high technology manufacturing or research and development establishments. Table 1 identifies these 15 firms, Six of the 15 are located in Hamilton, 6 are in Stoney Creek, 2 are in Dundas, and 1 is in Ancaster. Most firms are located on less expensive industrial lands. None employs more than 40 people and in total they employ approximately 260 people. High-tech industries within the Region include biotechnology, manufacture of printed circut boards, CAD-CAM development and manufacture, and software development. The Region does not have a large high technology base to build from, nor are the firms concentrated in one area.

A new high technology company usually begins operations in the community in which the founders work and live. Companies just starting out are generally very small, with few expenditures in plant, equipment or capital. Often firms work out of a garage or basement during the initial stages of the company's development. New firms usually involve a small team of people who understand new aspects of technology that they expect to utilize in order to develop a new process or marketable product. In

the initial stages, these firms are primarily engaged in research and development.

In the Steed and DeGenova survey of 45 manufacturers in Ottawa's technology-oriented complex, the majority of the entrants were new firms rather than parts of firms already established elsewhere. As mentioned earlier, 41 of the 45 firms had founders who had a strong local association with the Region. The literature suggests that new firm founders tend to locate within their home area, typically after operating the business in makeshift headquarters in the basements of their homes.

The Ottawa technology center contains only 6 foreign subsidiaries, 2 from Britain and 4 from the United States. In terms of employment, most firms are relatively small; only 12 of the 45 firms had more than 100 employees.

The most logical source of new high technology industries within the Region is McMaster University professors or graduates developing marketable applications from their research. Table 2 lists the research strengths of McMaster University in relation to high technology. Two of Hamilton-Wentworth's high technology firms are direct offshoots of McMaster. A third high technology firm associated with McMaster is considering an industrial location within the Region. Other high-tech spin offs from McMaster have located outside the Region in areas such as Oakville and Burlington. An effort should be made to locate newly established high technology industries within the Region. While these new industries could make a substantial contribution to the development of high technology within Hamilton-Wentworth, it is unlikely that either the number of new firms or employment generated will be significant in relation to the current industrial base.

TABLE 1

HIGH-TECH INDUSTRIES IN HAMILTON-WENTWORTH

NAME OF INDUSTRY	ADDRESS	PRODUCT	# OF EMPLOYEES
Southam Inc.	44 Frid Street Hamilton	Software for Newspaper Computer	40
A-B Biological Supplies Inc.	Chedoke-McMaster Hospital, Hamilton	Diagnostic Research Lab	8
Wintek Systems	2520 Barton Street E. Hamilton	Industrial Micro Processor Controls	5
RMS Rectifiers Products Ltd.	35 Milburn Road Hamilton	Silicon Selenium Rectifiers	10
Canada Packers M.T.C. Pharmaceuticals	1890 Brampton Street Hamilton	Veterinary Pharmaceuticals	20
Solarfin Products	14 Victoria Avenue N. Hamilton	Solar Lab Equipment, Solar Energy Systems	4
Istec Ltd.	1810 Highway #6 N. Dundas	Gyrostabilized Optical System, Specialized Optics	15
J.W. Anderson Co. Ltd.	44 Head Street Dundas	Reverse Osmosis Units	50
Canadian Insitute of Metalworking	1276 Sandhill Drive Ancaster	CAD/CAM Equipment Training Prog.	15

TABLE 1 (continued)

Tektron Equipment Corporation	263 Barton Street Stoney Creek	Electronic Assemblies Printed Circuits Micro Processor Designs	24
IRD Mechanalysis Ltd.	337 Barton Street Stoney Creek	Spectrum Analysers, Dynamics Balancing Machines	36
Dynamic Circuits	9 Pinelands Avenue Stoney Creek	Printed Circuit Boards	23
Proto Circuits	9 Pinelands Avenue Stoney Creek	Printed Circuit Boards	10
Marcelissen Machining	343 Barton Street Stoney Creek	Aircraft Components	5
Ponterfact Controls	428 Millen Avenue Stoney Creek	Assembly of CAM operated Controls	7

TABLE 2

TECHNOLOGY -RELATED

RESEARCH STRENGTHS OF MCMASTER UNIVERSITY

o	BIOTECHNOLOGY	- MONOCLONAL ANTIBODIES - MOLECULAR BIOLOGY - FERMENTATION ENGINEERING
o	MATERIALS RESEARCH	- METALLURGY - CERAMICS
o	METAL CUTTING AND FORMING	
o	SEISMIC WORK (APPLIED DYNAMICS)	
o	COMMUNICATIONS RESEARCH	- SIGNAL PROCESSING - SURFACE ACOUSTICAL WAVE DEVICES - MICROWAVES - LASER OPTICS
o	ROBOTICS	
o	NUCLEAR RADIOGRAPHY	
o	POWER ENGINEERING	
o	POLYMER PRODUCTION	- PROCESS CONTROL

It is difficult to judge the marketability of high technology products or product lifespan because technology does not develop in a linear fashion. Discussions with Dr. Alvin Lee, President of McMaster University, Dr. Alan Frost, Assistant Vice-Presdent Research Services, and Dr. Arthur Heidebrecht, Dean of Engineering, suggest that the Region could expect to obtain a maximum of one new high technology firm per year as a spin-off from McMaster. In the long run successful high technology companies may themselves create spin-offs.

THE LOCATION OF HIGH TECHNOLOGY DEVELOPMENT

Since the primary source of locally generated high technology development is expected to be McMaster University, any high technology industry would benefit from a location close to the University. Spin-off companies from McMaster have expressed interest in both the Ancaster and Clappison's Corners Industrial-Business Parks. These locations and the Allarco Industrial-Business Park seem viable and complement the residential characteristics of Dundas and Ancaster, which have proven to be attractive to professionals and executives. These parks are away from the heavy industrial core and have ample room for company expansion. However, given the limited opportunity for attracting external firms and the expected slow rate of development of local high-tech entrepreneurial activity, a large amount of land is not required.

Setting aside land exclusively for high tech development has several disadvantages:

1. Many areas are trying to attract high-tech firms. This increases the likelihood of the park being unsuccessful or taking a long time to develop;

2. Estimating the demand for high technology land in the future is extremely difficult given the rapid changes in the field;

3. High tech industrial parks typically require long periods to develop, potentially leaving valuable serviced land unused for many years; and,

4. Allocating land solely for high-tech precludes the use of land for other compatible purposes and limits its income generating potential.

Consequently, the development of a portion of an industrial-business park specifically restricted to high technology firms is not recommended.

Alternatively, land in the Ancaster, Allarco and Clappison's Corners Industrial-Business Parks could be designated as a high level prestige industrial area, with appropriate site development standards suitable for high-tech as well as other compatible uses.

A partially decentralized pattern of development would allow companies some locational flexibility within the Region while still ensuring a suitable high quality local environment, increasing the probability of retaining locally generated technology firms. Decentralization is consistent with the locational pattern of the high tech firms currently situated in the Region and conforms with the development pattern in Canada's best known high-tech center, Ottawa (see map). High tech development in Ottawa now appears to consist of a series of agglomerations, rather than one large one.

One obvious location for a high level prestige industrial designation is a portion of the Ancaster Industrial-Business Park near the Canadian Institute of Metalworking (CIM) location. Further research and consultation with industry and the affected area municipalities is required to determine the details of the location, size, permitted uses, development standards and the nature of the interface between high tech and non-compatible industries.

The preferred method for implementing the prestige industrial designation would probably be by zoning by-laws and site plan control on privately-owned land and restrictive covenants on Regionally-owned land.

Consideration should be given to encouraging the development of industrial malls in which small high technology firms could lease low cost space. The enterprise and innovation centers proposed in the May 15, 1984 Ontario budget could also provide a useful vehicle for nurturing newly formed high technology firms.

CONCLUSIONS:

1. High technology industry is an attractive source of potential economic development.

2. Hamilton-Wentworth is capable of satisfying many of the locational requirements of high technology industry, but the high level of competition will make it difficult for the Region to attract a significant number of established high technology firms.

3. High technology firms generated from within the Region will be the primary source of high-tech development in Hamilton-Wentworth, particularly spin-offs from McMaster University.

4. High technology firms cannot be expected to make a significant contribution to employment in Hamilton-Wentworth.

5. Concentrating the marketing effort on a single sector of high technology industry would limit the number of potential firms and would be unlikely to produce an agglomeration of firms in Hamilton-Wentworth.

6. The long gestation period of high technology parks would be likely to severely constrain the development and income generating potential of land allocated exclusively for high technology uses in the short to medium term.

7. A high level prestige industrial designation designed to meet the needs of high technology firms and other compatible firms should be established in the Ancaster, Allarco and Clappison's Corners Industrial-Business Parks.

8. High technology spin-offs from McMaster University should be encouraged to locate in the appropriate areas of the Ancaster, Allarco and Clappison's Corners Industrial-Business Parks.

RECOMMENDATION:

That the Council of the Region of Hamilton-Wentworth:

1. Focus its high technology strategy on the encouragement and provision of support to locally generated high technology firms.

2. Create no special programs for the attraction of high technology firms to the Region, but include high technology firms in the Economic Development Department's normal promotional activities.

3. Recommend to the area municipalities that no specific area in the Region's industrial-business parks be allocated exclusively for high technology development but rather that prestige industrial areas with site development standards suitable both for high-tech industries and other compatible industrial uses be allocated in the Ancaster, Allarco and Clappison's Corners Industrial-Business Parks.

4. Coordinate implementation measures with the affected area municipalities, other relevant agencies and individuals, including the amount of land to be set aside for prestige use, development standards, the location within the park,

compatible uses, and design considerations for the interface between prestige industrial and other uses.

5. Direct staff to continue to maintain active communication with McMaster University and Mohawk College in order to make prospective entrepreneurs aware of opportunities in Hamilton-Wentworth, to assure new firms that they are highly valued, and to provide them with assistance in establishing new plants in the Region.

APPENDIX A: SELECTED HIGH TECHNOLOGY REPORTS AND STUDIES

Association of Bay Area Governments. Silicon Valley and Beyond: High Technology Growth for the San Francisco Bay Area Berkeley: December 1981.

Bowlby, Kenneth. Report on Corporate Site Selection Study (including Hamilton analysis) London: March 1984.

Cisneros, Henry G. San Antonio's Place In the Technology Economy: A Review of Opportunities and a Blueprint for Action Mayor's Office, San Antonio: September 1982.

City of Chicago. Mayor Jane Byrne's Task Force on High Technology Development, Volumes 1 and 2, Chicago: October 1982.

DeGenova, Donald and Steed, Guy, "Ottawa's Technology-Oriented Complex" Canadian Geographer March 1983, pp 263-278.

Goldwater, Leslie. "Can Hi-Tech Turn Us Around?" Iron Age April 13, 1983, pp 47-63.

Goodfellow, Matthew. "What's High Tech All About?" Area Development Sites and Facility Planning, April 1984, pp 66-86.

Huntley, Steve. "High Tech: No Panacea for the Jobless" U.S. News and World Report, March 7, 1983, p. 74.

Kornin, M. W. et. al. "High Tech: Blessing or Curse?" U.S. News and World Report, January 16, 1984, pp. 38-44.

Malecki, Edward J. "High Technology and Local Economic Development" Journal of the American Planning Association Vol. 50, Number 3, Summer 1984, pp. 262-269.

New York State Science and Technology Foundation. Development of High Technology Industries in New York State Special Report I,III,IV, and V, Albany: April 1982

Ontario Manpower Commission. Manpower Requirements in the High Technology Electronics Industry in Ontario: 1981-1985, December 1982.

Ontario Ministry of Treasury and Economics. Economic Transformation: Technological Innovation and Diffusion in Ontario, Toronto: March 1984.

Sweetman, Keri. "Ottawa Also Is Our High Tech Capital" Canadian Geographic Vol. 102, Feb./March 1982, pp. 20-26.

U.S. Congress, Joint Economic Committee. Location of High Technology Firms and Regional Economic Development, June 1982.

U.S. Department of Commerce. An Assessment of U.S. Competitiveness in High Technology Industries, February 1983.

Wiewel, Win; de Bettencourt, James; and Mier, Robert. "Planners, Technology and Economic Growth" Journal of the American Planning Association Vol. 50, Number 3, Summer 1984, pp. 290-296.

"America Rushes to High Tech for Growth" Business Week, March 28, 1983, pp. 84-90.